

# Section 4 Northern New Mexico Math and Science Academy

$$2 = \frac{8}{x}$$

Solve for  $x$

$$2 = \frac{8}{x} \text{ multiply both sides by } x$$

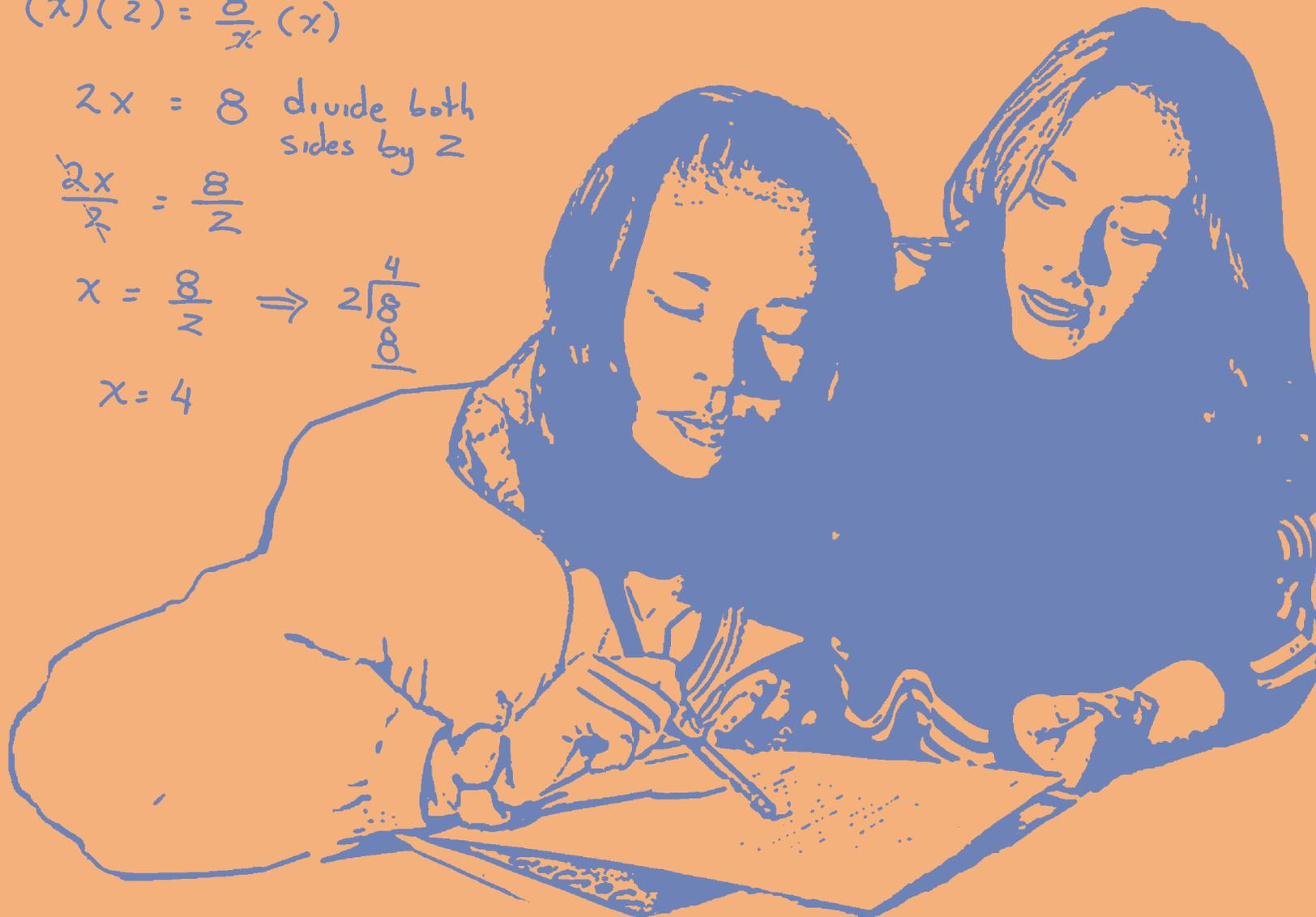
$$(x)(2) = \frac{8}{\cancel{x}}(x)$$

$$2x = 8 \text{ divide both sides by } 2$$

$$\frac{2x}{\cancel{2}} = \frac{8}{2}$$

$$x = \frac{8}{2} \Rightarrow 2 \overline{) 8} \\ \underline{8} \\ 0$$

$$x = 4$$



## Northern New Mexico Math and Science Academy

**Program Description.** Student test scores and teacher competency surveys reveal a great need for improving teacher quality and student achievement in northern New Mexico. To meet this need, the Northern New Mexico Council on Excellence in Education (NNMCEE, a consortium of educational leaders from across northern New Mexico) developed the Math and Science Academy (MSA, the Academy) with support from three local school districts, (Mora, Chama, and Española), the Northern Network for Rural Education, the University of California, and Los Alamos National Laboratory (LANL, the Laboratory). The development of the Academy was a “good neighbor” initiative on the part of the Laboratory in response to needs stated by NNMCEE. Fiscal year 2003 (FY03) was the third year of operation for the program.

The program focuses on middle-school, core-area teachers in northern New Mexico (Chama Middle School, Española Middle School, and Mora Middle School) for three reasons: First, the developers of the program believe that high-quality, middle-school teachers are essential to the future success of students because these teachers can affect attitudes toward education and the attainment of academic success at a critical time in the students’ careers. Second, the organizers believe that targeting middle schools will help decrease the dropout rate for ninth graders. Third, expansion of the program can take place either toward high schools or toward elementary schools, depending on the school district.

MSA seeks to use effective professional development to improve education. This professional development includes training in research-based best practices, support in the classroom during the school year through cognitive coaching, and structured time for collaboration among teachers. As teachers become more effective and understand standards-based instruction better, they become the catalysts for systemic reform in their schools. The increase in teacher quality leads to improved student achievement. Once they are trained in this approach, MSA teachers serve as coaches to other teachers in their schools. MSA staff members develop, deliver, and coordinate training and follow up in classrooms. The MSA master teachers have 72 years of combined experience in education.



**Students work on science assignments in the classroom of Benito Cordova, a participant in the Math and Science Academy who teaches at Española Middle School East.**

MSA follows standards set by the National Staff Development Council (NSDC). These standards state that all professional development should do the following:

- Result in improved learning for all students;
- Focus on equity for students, quality teaching, and family involvement;
- Use research-based strategies;
- Create a community of learners where leadership is valued and shared; and
- Support decisions based on data.

This report reflects the way that the NSDC standards have affected the practice of MSA. A full report of NSDC standards can be found at <http://nsdc.org/>.

**Math and Science Academy Model.** MSA uses standardized test data, State Content Standards and Benchmarks, school district documents including the Educational Plan for Student Success, and recent research on teacher quality as the informational foundation for practice. New school sites for expansion of the program are chosen by Program Director Kurt Steinhaus, with input from the MSA staff. At the point of recruitment, MSA staff members visit a faculty meeting and present the MSA model and a sample log as part of the invitation for joining MSA. Permission to extend the invitation is granted by the school district and the interested principal. Teacher teams are encouraged to join together because one basic tenet of the program is based on research on the power of collaboration and social cognition (Lev S. Vygotsky, "Speech and Thought," 1986).



The MSA effort begins each summer with the Leadership Institute for Administrators. The two-day institute gives MSA principals and other administrators an overview of program requirements and the training that teachers will be receiving during the year. The institute also emphasizes the principal's role in helping teachers to implement MSA principles and discuss current research on educational leadership. Leadership Institute 2003 made use of research by the following authors:

- Charlotte Danielson, "Teacher Evaluation," the Association for Supervision and Curriculum Development (ASCD), 2001;
- James H. Stronge, "Qualities of Effective Teachers," ASCD, 2001; and
- Ruby Payne, "A Framework for Understanding Poverty," Aha!Process, 2000.

In the document "Leadership Institute 2001-2003 Trends and Implications," R.L. Siporin said, "Attendance for the 2003 Leadership Institute experienced a dramatic surge from the previous year. Fourteen principal participants went through the institute; all agreed that the institute was valuable. All participants strongly agreed that the information presented would assist in improving their leadership."

The next step in the MSA annual effort, the Summer Institute, gives teachers two weeks of intensive training in standards-based education. Because of the increase in the number of MSA participants, Summer Institute 2003 was conducted in two separate two-week sessions. The addition of a new MSA staff member made possible the increase in the number of MSA participants and an increase in the number of schools served.

In the document "Improving Student Learning: Applying Deming's Quality Principles in the Classroom," L. Jenkins said, "(The) Summer Institute provides time for teachers to think about their curriculum, to begin working in teams, to learn new instructional strategies, and to use technology as a teaching tool. (The) Summer Institute also introduces teachers to research-based best practices in the classroom and lays the foundation for sound educational planning and assessment. Undergirding all work done during Summer Institute 2003 was the theme of the integration of technology in all areas of classroom work. MSA participants in Summer Institute 2003 were instructed in the use of Microsoft Excel and QI Macros for Excel for data collection and analysis. The emphasis on using data to inform decisions is based on research that shows that using data increases student achievement."

Academic-year follow-up supports teachers in the implementation of MSA principles introduced during the Summer Institute. This key feature is the difference between MSA and other professional-development programs. The follow-up in the classroom consists of observations, reflections, and advanced training during after-school meetings. MSA requires teachers to participate in an online collaborative effort by responding to prompts on a virtual workspace accessed through the Internet.

In addition, teachers are encouraged to enhance communication with parents and the community. Teachers at all sites held “Celebration of Learning” events in FY03 that allowed students to present what they had learned to parents and community members. Response was positive at all sites. In Española, planners scheduled the event to coincide with a basketball game and the Cultural Fair. This approach further encouraged participation by all faculty members and students, producing an outpouring of parent participation and community involvement.

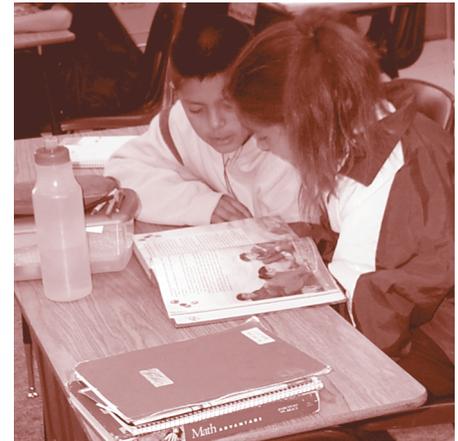
Reflective portfolios kept by MSA teachers are designed to show growth in one teacher-selected focus area. These portfolios were showcased at Saturday meetings held in Española in December and in May. Student work was also the focus of weekly after-school meetings. “Tuning Protocol: A Process for Reflection on Teacher and Student Work” was used to refine assignments and ensure that students were meeting high expectations that were driven by standards.

Data collection in the classroom was one major theme of MSA during FY03. Teachers wrote out the concepts they intended to teach during the school year and used these concepts to implement “Data Not Guesswork (DNG),” a tool for charting student learning. The teachers who used DNG consistently in their classrooms reported that this method informed them about student learning and how well they were teaching.

One teacher said, “Students seemed to know and understand the importance of standards and benchmarks better.” Another commented, “I took questions from all the material I planned on using throughout the year. We corrected it together and discussed it briefly. It was a great way to introduce concepts before we covered them in class. It was a great way to review/reinforce what was already taught.”

At the end of the school year, a focus group was established to create reports of teacher experiences during the school year. The National Center for Research on Evaluation, Standards, and Student Testing (CRESST) also gathered reports and teacher surveys to assess program effectiveness. Overall, teachers and administrators ranked the third year of the program as higher in effectiveness than the first two years.

Reflection, an important facet of MSA, is the focus of MSA Saturdays twice a year and at the “Debrief”—a three-day session after the school year ends that combines review of MSA efforts during the year and a look forward to the upcoming year. During Debrief 2003, the veteran MSA teachers were invited to participate in a focus group for the purpose of collecting qualitative feedback about the various changes instituted in MSA. One teacher who commented on feelings about the difference the MSA process made in the classroom said, “I feel that the informal observations have really helped me to home in on some of the things that I could change in my classroom in a positive way. The preconference made me really think about my lesson plan and what I wanted out of it....” The teacher said that having someone in the classroom to observe “in a completely non-threatening way” was very helpful, especially because it was possible to ask the observer to focus on certain aspects of teaching.



**Gavin Cata and Lorraine Martinez (left to right) work together in the fifth grade classroom of LeAnn DeCoeur, a teacher at Eutimio Salazar (Fairview) Elementary School in Española who participates in the Math and Science Academy.**

**Performance.** MSA's goal is to improve math and science education significantly and to initiate systemic reform grounded in standards-based education through intense, ongoing professional development and classroom follow-up that increases both content and pedagogical knowledge.

The initial performance objective for MSA is sustained change in teacher practice that focuses on and supports standards-based education. The ultimate objective is an increase in student achievement in math, science, and technology application.

**Growth in Participation.** MSA started in the summer of 2000 with 12 middle-school teachers from three districts: Chama, Española, and Mora. In FY03, there were 56 participants from nine schools in four districts. There were four middle-school teachers and eight elementary-school teachers from Chama; seven teachers from Carlos F. Vigil Middle School in Española; 11 teachers from Española Middle School East; four middle-school teachers and three elementary-school teachers from Mora; and 10 elementary-school teachers from Pojoaque. The program affects approximately 1,200 students.

**Teacher Growth.** Change in teacher practice in FY03 was documented by means of classroom visits, surveys, and a focus group at the end of the school year. CRESST continued to provide external evaluation. For a complete report, go to the following website: <http://education.lanl.gov/newEPO/k12/MSA/MSAindex.html>.

Here is an excerpt from the report:

*Overall, however, teachers reported, on surveys, interviews and observations, that they were more regularly and consistently planning instructional programs that focused on student learning. Additionally, teachers used the ideas and concepts developed collaboratively during the Summer Institute as a steppingstone to conversations about teaching and learning goals.*

*Teacher 1: As a result of working with MSA, I now analyze each and every move I make in the classroom, always thinking about the students and what they need. I almost debrief with myself on a class-by-class basis to determine if the success that I want was present or if we need to elaborate on a concept even more. The initial planning of lessons is the biggest change in my teaching philosophies. I am actually planning with assessment in mind first. I have never done that before.*

Teacher growth was noted in several areas including curriculum, assessment, instructional strategies, and technology.

**Student Achievement.** In FY03, teachers reported an increase in student achievement that they attributed to their participation in MSA. Below are two relevant sections from the CRESST report:

*Teachers also reported, somewhat reluctantly, that one of the many indicators they used to gauge project progress and success in implementation was standardized achievement test scores.*

*Teacher 2: I hate to use the Terra Nova as a basis for talking about student learning, but the fact is our test scores increased this year. Our math scores increased dramatically in reference to the past scores. I think this is because of the work our team has done with MSA for the past three years.*



**CTB/Terra Nova Scores.** Test results support the research that indicates it takes three to five years for professional development to have an impact on student achievement. Here is a final, relevant, quote from the CRESST report:

*During Year 3 of MSA, project teachers continued to implement MSA goals and objectives with increasing success and savvy. Teachers' willingness to try new approaches, to collaborate, and to engage in reflective teaching practices increased in both quantity and quality. Student achievement, in some classrooms for some teachers, increased. Student attitudes toward learning, reflected in the nature and quality of their work and interactions with each other and with their teachers, improved. Growth was most dramatic for third year MSA teachers who fully implemented most (if not all aspects) of the program. MSA teachers continue to make important strides toward refining their teaching practices and implementing the instructional strategies, methods, and tools to support and strengthen student learning and achievement.*

**Highlights of This Year's Accomplishments.**

MSA achieved many successes in FY03. Five are described below.

**MSA Teachers Became Coaches.** The MSA teachers in Chama were asked to coach the Chama elementary-school teaching staff. This request was the result of Chama Elementary School being identified as "performance warned" at the beginning of the 2002-2003 school year. The principal who oversees both the elementary school and the middle school in Chama seized this opportunity to provide in-house coaching for his staff, using the expertise of third-year Level II MSA teachers at the middle school.

The MSA teachers began practicing their coaching skills at the beginning of the school year by observing and reflecting on each other's lessons rather than by having the MSA staff lead the cognitive coaching protocol.

When MSA teachers were asked to provide coaching and training, the principal also asked the school board to fund after-school time for the elementary-school staff and a stipend for the MSA teachers. The board agreed.

The extension of MSA into the elementary school took on its own personality. MSA teachers used the time they had together to forge positive relations with the elementary-school staff and to provide for basic training and discussion in building collaborative relationships. MSA stepped in and invited all Chama Elementary School faculty members to join MSA, and the faculty members participated in Summer Institute FY03. MSA teachers at Chama Middle School agreed to provide cognitive coaching for each new MSA teacher six times during the school year.

As a result of timely interventions by the principal, the work of MSA teachers, and the efforts of the students and teachers, Chama Elementary School increased scores sufficiently to be identified as "meets standards" by the beginning of the 2003-2004 school year.

**MSA Won an Award.** The MSA staff was presented with the LANL Foundation President's Award at the foundation's annual banquet in the fall of 2002. The award is presented to organizations funded by the foundation that exemplify its ideals and goals.



**Artie Vigil hesitates, thinks carefully, and spells a word correctly, advancing his team through the "bases" in an unusual spelling bee at Eutimio Salazar (Fairview) Elementary School in Española. These fifth graders are in the classroom of Jeanette Martinez, a teacher who participates in the Math and Science Academy.**



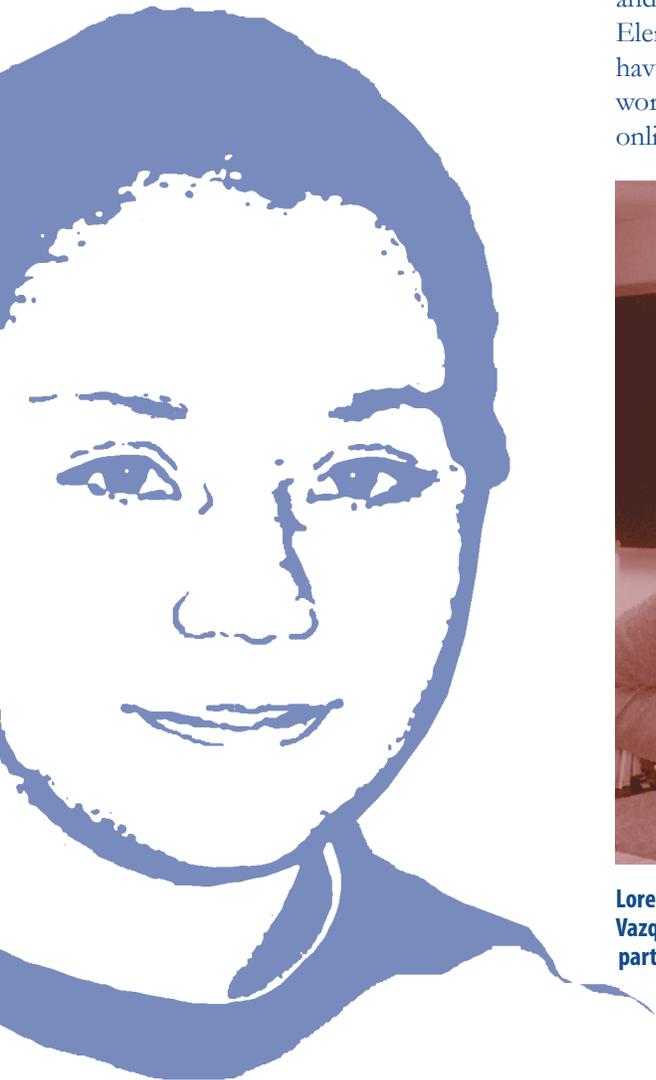
**MSA Added Staff.** Lorenzo Gonzales became the third MSA staff member in April 2003. Gonzales has 29 years of experience as a classroom science teacher, primarily at Cuba High School. He has been a recipient of the Milken Foundation Award for excellence in teaching and a Golden Apple Award. In addition, he has been a Regional Education Technology Assistance Program (RETA) Regional Resource Center coordinator and trainer and a member of the national cadre of MarcoPolo Internet Content for the Classroom trainers. During Summer Institute FY03, he trained principals and teachers in the use of QI Macros for Excel for collecting, displaying, and analyzing data.

**MSA Received Legislative Funding.** FY03 marked the third year that MSA had sought legislative funding for its professional-development efforts. This time, New Mexico Senator Richard Martinez and New Mexico Representative Nick Salazar worked effectively to achieve approval of funding. All the money from this legislative grant will go toward teacher stipends for training. As a result of this allotment, MSA was able to increase the number of MSA teachers from 22 to 56 in FY03.

The new MSA teachers represent an expansion of the MSA program into the elementary schools. Those new to MSA in school year 2003-2004 will include teachers from Pojoaque Intermediate School, Chama Elementary School, Mora Elementary School, San Juan Elementary School, and Eutimio Salazar (Fairview) Elementary School. These schools have teams of teachers who are working together after school and online.

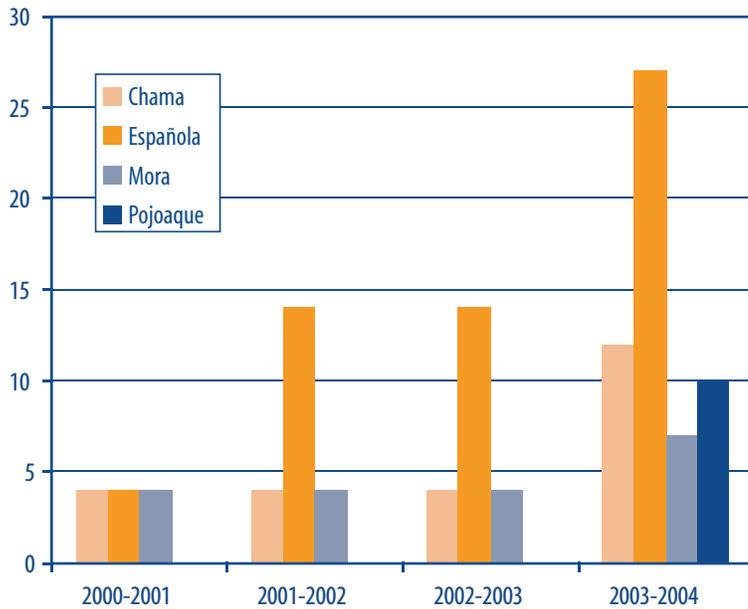
**MSA Launched Videoconferencing.**

Videoconferencing units in Española, Mora, and Chama made a new kind of communication a reality in FY03, easing the travel demands that teachers had faced. In May, a five-way videoconference was held during an NNMCEE meeting, launching the beginning of this new phase of MSA communication. The funding for the equipment and set-up came from a grant from Twenty First Century Learning, from the Technology Literacy Challenge Fund, and from Qwest. The equipment is used in conjunction with computers and the Internet. At all three sites, the technology department has been instrumental in ensuring that the equipment is operational at all times.



**Lorenzo Gonzales, a master teacher in the Math and Science Academy, talks shop with Yanira Vazquez, a fifth grade teacher at Eutimio Salazar (Fairview) Elementary School in Española who is a participant in the academy.**

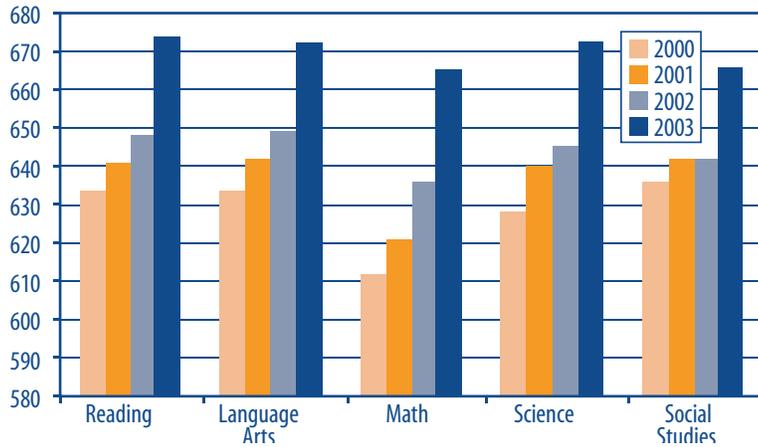
The number of MSA participants has grown in all four schools.  
 This bar graph shows the number of MSA participants in school years 2003 through 2004



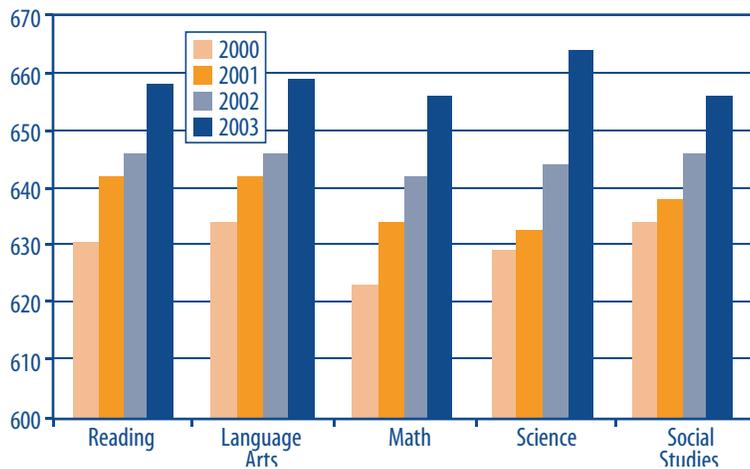
This table shows teacher reports of student learning and achievement .  
 1 = disagree, 3 = moderately agree, 5 = strongly agree, NA = Not applicable.

Please indicate your observations regarding student learning and achievement during 2002-2003.		Mean (standard deviation)
a)	I have observed changes in students learning and achievement this year.	4.1 (0.7)
b)	My participation in MSA had a positive impact on my students' learning and achievement this year.	4.3 (0.7)
c)	MSA ideas helped increase student learning and achievement.	4.6 (0.5)

**MSA produced statistically significant improvement in scores.**  
**This bar graph shows School A: Seventh Grade MSA CTB/Scale Scores (n=20).**



**Math and science scores showed statistically significant increases at School B. This bar graph shows School B: Seventh Grade MSA CTB/Scale Scores (n=51).**



**These scores are for all School C seventh graders. Seventh Grade MSA CTB/Scale Scores (n=390). Some did not have MSA teachers for all subjects.**

